

Notice of Allowability

Application No.

10/518,425

Examiner

Minh N. Tang

Applicant(s)

TADATSU, TAKASHI

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10/18/2006.
2. ☒ The allowed claim(s) is/are 1-14.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 7/12/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

Election/Restrictions

1. The restriction requirement mailed on September 18, 2006 has been reconsidered and is hereby withdrawn.

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application. Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on July 12, 2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Reasons For Allowance

4. Claims 1-14 are allowed over the art of record.
5. The following is an examiner's statement of reasons for allowance:

Claim 1 recites, inter alia, a current sensor comprising a flux detecting means arranged in the middle leg magnetic circuit; and a detection circuit connected with the flux detecting means and outputting the electric signals interlocked with the flux being detected by the flux detecting means.

Claim 3 recites, inter alia, a current detecting method comprising achieving magnetic non-balance condition due to collapse of the magnetic balance condition, which is caused by running detected current along a detected wire passed through at least one of a window which is formed by being surrounded by a first outer leg magnetic circuit and the middle leg magnetic circuit and a window which is formed by being surrounded by a second outer leg magnetic circuit and the middle leg magnetic circuit to vary the magnetic reluctance of the first outer leg magnetic circuit and the second outer leg magnetic circuit; and detecting the detected current running along the detected wire by detecting the flux which is generated along the middle leg magnetic circuit through achieving the magnetic non-balance condition, by a detection circuit outputting the electric signals interlocked with the flux being detected by a flux detecting means.

Claim 4 recites, inter alia, a current detecting method comprising achieving magnetic re-balance condition by running balance recovery current along a balance recovery coil to decrease the flux being generated along the middle leg magnetic circuit in the condition that magnetic reluctance of the first outer leg magnetic circuit and the second outer leg magnetic circuit is varied, wherein the balance recovery current, which generates the flux of which the magnitude is as same as that of the flux being generated along the magnetic circuit around which the detected wire is wound by being passed

therethrough in the condition that the magnetic reluctance of the first outer leg magnetic circuit and the second outer leg magnetic circuit is varied and the direction is reverse to that of the flux, is run along the balance recovery coil which is wound by being passed through the same window as the window through which the detected wire is passed; and detecting the detected current running along the detected wire by detecting the balance recovery current running along the balance recovery coil in the magnetic re-balance condition.

Claim 5 recites, inter alia, a current sensor comprising a sixth magnetic circuit having opposite ends, wherein one and the other ends of the sixth magnetic circuit are connected with a contact between the second and fourth magnetic circuits and a contact between the third and fifth magnetic circuits, respectively; a flux detecting means arranged to detect a flux of the first magnetic circuit; and a detection circuit connected with the flux detecting means and outputting the electric signals interlocked with the flux being detected by the flux detecting means.

Claim 10 recites, inter alia, a current detecting method comprising achieving magnetic non-balance condition due to collapse of the magnetic balance condition, which is caused by running detected current along a detected wire passed through at least one of the window surrounded by the first, second and fourth magnetic circuits and the window surrounded by the first third and fifth magnetic circuits to vary the magnetic reluctance of at least one of the second, third, fourth and fifth magnetic circuits; and detecting the detected current running along the detected wire by detecting a flux which is generated along the first magnetic circuit through achieving the magnetic non-balance

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condition, by a detection circuit outputting the electric signals interlocked with the flux being detected by a flux detecting means.

Claim 11 recites, inter alia, a current detecting method comprising achieving magnetic re-balance condition by running balance recovery current along a balance recovery coil to return to the magnetic reluctance prior to variation the varied magnetic reluctance of the magnetic circuit of which the magnetic reluctance is varied and thus decrease a flux being generated along a first magnetic circuit in the condition that the magnetic reluctance of at least one of second, third, fourth and fifth magnetic circuits is varied; and detecting the detected current running along the detected wire by detecting the balance recovery current running along the balance recovery coil in the magnetic re-balance condition.

Claim 12 recites, inter alia, a magnetic bridge comprising a flux detecting means arranged in the middle leg magnetic circuit; wherein the magnetic bridge achieves magnetic balance condition by generating a first excited flux which is an alternating flux to run along the middle leg magnetic circuit by the first exciting means and generating a second excited flux, of which the magnitude is as same as that of the first excited flux and the direction is reverse to that of the first excited flux, which is an alternating flux to run along the middle leg magnetic circuit by the second exciting means.

Claim 13 recites, inter alia, a magnetic bridge comprising a sixth magnetic circuit having opposite ends, wherein one and the other ends of the sixth magnetic circuit are connected with a contact between the second and fourth magnetic circuits and a contact between the third and fifth magnetic circuits, respectively; a flux detecting

means arranged to detect the flux of the first magnetic circuit; wherein the magnetic bridge achieves magnetic balance condition in which the flux by the exciting means is not present in the first magnetic circuit, by properly selecting the magnetic reluctance of the second, third, fourth and fifth magnetic circuits to equalize magnetic potential of the opposite ends of the first magnetic circuit.

Claim 14 recites, inter alia, a magnetic bridge comprising a fifth magnetic circuit having opposite ends, wherein one and the other ends of the fifth magnetic circuit are connected with a contact between the first and third magnetic circuits and a contact between the second and fourth magnetic circuits, respectively; wherein the magnetic bridge achieves magnetic balance condition in which magnetic potential of the contact between the first and second magnetic circuits and the contact between the third and fourth magnetic circuits is equalized by properly selecting the magnetic reluctance of the first, second, third and fourth magnetic circuits.

The art of record does not disclose the above limitations, nor would it be obvious to modify the art of record so as to include the above limitations.

Claims 2 and 6-9 are allowed due to their dependency.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Communication

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minh N. Tang whose telephone number is (571) 272-1971. The examiner can normally be reached on M-F (7:00-3:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ha T. Nguyen can be reached on (571) 272-1678. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



**MINH NHUT TANG
PRIMARY EXAMINER**

01/04/07